



ORIGINAL ARTICLE

## Is there vitamin D deficiency in children in a sunny Mediterranean city?☆



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### KEYWORDS

Vitamin D;  
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Toddler;  
Prophylaxis;  
Sun exposure

### Abstract

**Introduction:** Despite the increasing interest in vitamin D functions, new cases of deficiency have been reported in sunny regions where optimal levels are expected. The aim of this study was to analyze 25-hydroxvitamin D levels in children younger than 2 years admitted for acute mild diseases in a tertiary hospital in Valencia and its relationship with factors that can be associated with its deficiency.

**Methods:** This one year prospective and observational study was conducted on 169 children admitted for acute mild diseases. 25-Hydroxvitamin D levels were analyzed. A standardized physical examination and structured interviews to the parents were performed. Children were classified into two groups, according to 25-hydroxvitamin D levels (cut-off 30 ng/mL).

**Results:** A total of 169 children were included, with a median age of 9 months, being more prevalent Caucasians (75.7%) and younger than one year old (79.3%). Almost one quarter (24.3%) of the children had 25-hydroxvitamin D levels <30 ng/mL, more frequently in winter/spring, and in children with higher skin phototypes ( $P < .01$ ). Levels >30 ng/mL were associated with vitamin D prophylaxis during the first year, in children of a Caucasian mother, and those who did not wear a *hijab*. No statistical differences were found in diet characteristics ( $P = .65$ ). Prophylaxis was given to 47% of the breastfed children younger than one year.

**Conclusions:** In Valencia, Spain, 25-hydroxvitamin D levels lower than 30 ng/mL were found in a quarter of the children younger than two years. Our results emphasize the importance of vitamin D prophylaxis during the first year of life, even in sunny Mediterranean regions.

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**PALABRAS CLAVE**

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Lactante;  
Profilaxis;  
Exposición solar

**¿Existe déficit de vitamina D en los niños de una ciudad soleada del Mediterráneo?****Resumen**

**Introducción:** A pesar del creciente interés por las funciones de la vitamina D, siguen documentándose casos deficitarios en regiones soleadas donde se presuponen niveles adecuados. El objetivo del estudio es determinar los niveles de 25-hidroxivitamina D en menores de 2 años ingresados en un hospital terciario de Valencia por enfermedades agudas leves y su relación con factores que puedan estar asociados con su deficiencia.

**Métodos:** Estudio prospectivo y descriptivo de un año de duración en niños, entre uno y 24 meses, ingresados por enfermedades agudas leves. Se han estudiado los niveles de 25-hidroxivitamina D, junto con una anamnesis y exploración clínica estructuradas. Se dividió la muestra en 2 grupos, dependiendo de los niveles de vitamina D (punto de corte 30 ng/ml).

**Resultados:** Se estudiaron 169 niños, edad media de 9 meses, predominio etnia caucásica (75,7%) y menores de un año (79,3%). El 24,3% de los niños presentaba valores < 30 ng/ml, agrupándose en invierno/primavera y caracterizándose por fototipos cutáneos oscuros ( $p < 0,01$ ). Los factores asociados con niveles > 30 ng/ml fueron: administración de profilaxis, ser hijo de madre caucásica y que no usara *hiyab*. No existieron diferencias en el tipo de lactancia recibida ( $p = 0,65$ ). Solamente al 47% de los menores de un año amamantados se administró profilaxis.

**Conclusiones:** En Valencia, a pesar de la radiación solar suficiente, un cuarto de los niños < 2 años tiene niveles de 25-hidroxivitamina D < 30 ng/ml. Nuestros resultados deberían sensibilizar sobre la importancia de la suplementación vitamínica durante el primer año de vida, incluso en las regiones soleadas del Mediterráneo.

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**Introduction**

Vitamin D plays a crucial role in calcium and phosphorus metabolism and the mineralization of bone. In addition to this widely known function, research conducted in recent years has demonstrated its influence on various genes involved in cellular proliferation and differentiation and on the immune system.<sup>1,2</sup> These new findings reinforce the importance of maintaining optimal vitamin D levels in adults as well as children.<sup>2-4</sup>

The main source of vitamin D is sun exposure of the skin, so vitamin D deficiency is not an expected problem in cities located in the Mediterranean basin, where there are many hours of sunlight (region of Valencia, 2789 h of sunlight in 2013).<sup>5</sup> However, cases of rickets and severe deficiency continue to be reported in these areas, albeit only in high-risk populations.<sup>6-8</sup> Despite the recommendations made by the Spanish Association of Pediatrics (Asociación Española de Pediatría [AEP]),<sup>9</sup> the American Academy of Pediatrics (AAP)<sup>10</sup> and the European Society for Pediatric Gastroenterology Hepatology and Nutrition (ESPGHAN),<sup>11</sup> this continues to be a global health challenge, and it seems that preventive measures are not being implemented correctly.<sup>12</sup>

This could be due to other factors that reduce sun exposure, such as cultural habits, racial differences in skin pigmentation, and a reduction in the time spent outdoors, as well as the excessive use of sunscreen.

To gain a better understanding of these factors, it would be convenient to determine the vitamin D levels of the healthy population for all age groups. Substantial research

has been conducted in areas where vitamin D deficiency should not be expected *a priori*, especially on adolescents and school-aged children; however, infants have only been studied in countries with fewer hours of sunlight per year.<sup>13,14</sup>

The main objective of this study was to assess vitamin D levels in children aged less than 2 years admitted to a tertiary care hospital in Valencia with mild acute diseases. The secondary objective of this study was to determine the presence of vitamin D deficiency, describing the variables associated with it and its clinical manifestations.

**Materials and methods****Population under study**

We conducted a prospective observational study over a one-year period (December 2012 to November 2013) of the children admitted to the pediatric ward with mild acute diseases.

**Inclusion criteria**

- Age between 1 month and 2 years.
- Informed consent signed by parents.
- Availability of an adequate blood sample collected during the venipuncture performed to assess the disease for which the patient was admitted.
- Having undergone a structured history taking and physical examination in the context of the study.

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